CBRN Particulate Testing

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CBRN Particulate Testing

- Particulate testing is similar to the APR and APER particulate testing
- P100 Filter - Canisters shall meet the requirements for a P-100 filter which is 99.97% particulate filter efficiency against DOP
- Testing shall be performed after the durability conditioning
- Twenty (20) canisters will be tested against DOP
- Additionally nine canisters from cyclohexane service life tests will be tested against DOP

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PAPR DOP Flow Rate

- Constant flow PAPR – Individual canisters tested at the airflow of the PAPR. For multiple canister configuration the airflow will be reduced in proportion to the number of canisters
- Demand responsive PAPR - Individual canisters tested at 115 Lpm for moderate breathing rate or 300 Lpm for high breathing rate. For multiple canister configuration the airflow will also be reduced in proportion to the number of canisters
- Intend on looking at ways of measuring actual volume of air through the canister over a specific period of time

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PAPR DOP Flow Rate

We are aware that there is a need to perform the particulate test at the same airflow that the PAPR units supply.

Evaluating two separate concepts

1. Have new equipment developed to perform DOP testing: researching devices that will allow testing of filters up to 500 Lpm.
2. Use the existing TSI 8130 equipment for DOP testing: maximum airflow of approximately 110 Lpm generating roughly 100 mg/m3

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1st Concept: High Flow Tester Equipment

- Individual canisters will be tested at the airflow determined from the PAPR. This is the same airflow as the canister service life testing
- For multiple canister configuration the airflow will be reduced in proportion to the number of canisters
- Example: PAPR with measured airflow of 240 Lpm with three canisters elements, single canister will be tested at 80 Lpm with the loading proportionally reduced to 67 mg
- Example: Airflow of 240 Lpm with one canister, canister will be tested at 240 Lpm with the loading challenge of 200 mg

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2nd Concept: Existing Equipment

- Testing will be performed using a "test unit" sized proportionally, with the same effective surface area and geometry, to the airflow of the PAPR to produce an "Equivalent Face Velocity" through the filter at a flow rate of 85 Lpm. Test units will be provided by the manufacturer
- Example: PAPR with airflow of 240 Lpm using two canisters with an area of 100 cm^2. Test units would be produced to have an area of 71 cm^2 and tested at 85 Lpm The loading would also be reduced proportionally to a challenge of 142 mg

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Calculations for the example

- 240 Lpm with 2 canisters, so 120 Lpm per canister
- Set up ratio, X cm^2 / 85 Lpm = 100 cm^2 / 120 Lpm and solve
- X = 71 cm^2
- Therefore the "test unit" effective surface area would be 71 cm^2
- The concentration would also be reduced proportionally from 200 mg to 142 mg

  (X mg / 200 mg = 71 cm^2 / 100 cm^2)

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2^{nd} Concept: Existing Equipment (continued)

- Twenty (20) “Test Units” will be tested against DOP at 85 Lpm
- Twenty (20) production canisters will be tested against DOP at 85 Lpm after durability testing
- Additionally the nine production canisters from cyclohexane service life test will be tested against DOP at 85 Lpm

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Requirements

1st Concept

- High flow DOP Testers

2nd Concept

- Study of equivalent face velocity techniques and benchmarking of "test units"

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How will the decision be made and what factors will be used to decide which approach will be used?

1. **Input from the manufacturer and user community**

2. **Analysis of purchasing and maintenance requirements of high flow DOP testers**

3. **Benchmark studies of equivalent face velocity testing**

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Questions and Comments

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